

ABDUCENS NERVE PALSY AFTER SPINAL ANESTHESIA

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Abstract

We present a case of a 22-years-old patient who was hospitalized in order to plan an operative treatment of a rupture of the anterior cruciate ligament of the left knee and a lesion of the medial meniscus. The patient was injured during football training. Preoperative analyses (laboratory, transfusion analysis, EKG) were normal. The patient was not taking pharmacological therapy. He gave information about a COVID-19 infection 3 months ago with mild clinical manifestations.

The intervention was performed under spinal anesthesia with mild intravenous sedation. Vital parameters were as follows: tension 120/80mmHg, HR 76, and SpO₂ 98%. We administered 3.4ml of 0.5% Bupivacaine and 0.1mcg of Fentanyl. The puncture was performed with a 26-gauge cutting spinal needle. Three days after the operation, the patient complained of nausea, inability to handle the light, cephalgia and seeing double images, as well as inability to move the right eyeball to the right.

Key Words: cranial nerve palsy; diplopia; spinal anesthesia.

Introduction

This case highlights the importance of vigilance for atypical postoperative presentations and the need for prompt neurological evaluation and management. The motivation for reporting this case stems from its rarity and the potential implications for perioperative care. By sharing this clinical

encounter, we aim to contribute to the medical literature and raise awareness among clinicians regarding the possibility of neurological complications following spinal anesthesia.

Spinal anesthesia was the first regional anesthetic technique (1) The first operation under spinal anesthesia was performed in Germany in 1898. It was performed by August Bier. Spinal anesthesia is a technique in which the local anesthetic is injected directly in the subarachnoid space. It is used for procedures that involve the pelvis, lower extremities, and lower abdomen.

Complications of spinal anesthesia are of very low incidence. Severe complications are infrequent (1). Spinal anesthesia is an extremely safe technique especially when it is done by an experienced anesthesiologist (2). Some of the complications of spinal anesthesia are nausea, vomiting, neurological manifestations, spinal hematoma, arachnoiditis, post-dural puncture headache, and hypotension.

Case presentation

We present a case of a 22-year-old patient who was hospitalized in order to plan an operative treatment of a rupture of the anterior cruciate ligament of the left knee and a lesion of the medial meniscus. The patient was injured during football training. Preoperative analyses (laboratory, transfusion analysis, EKG) were normal. The patient was not taking pharmacological therapy. He gave information about a COVID-19 infection three months ago with a mild clinical manifestations. He doesn't smoke. The intervention was performed under spinal anesthesia with mild intravenous sedation. Vital parameters were as follows: tension 120/80 mmHg, HR 76, and SpO2 98%. We administrated 3.4ml of 0.5% Bupivacaine and 0.1 mcg of Fentanyl. The puncture was performed with a 26-gauge spinal needle. The postoperative course was normal and the patient was mobilized on the same day.

Three days after the operation, the patient complained of nausea, inability to handle the light, cephalaea and seeing double images, and inability to move the right eyeball to the right. A neurologist was consulted. During the examination, the patient was aware and oriented in all directions. His speech was intact. The eyeballs were centrally positioned in the orbits, and pupils were isochoric, with an orderly reaction to direct exposure to light. Diplopia was reported when looking to the right. Nystagmus was not observed during the examination. No facial muscle asymmetry was noted. Speech function was normal without any deviations. Symmetrical elevation of palatal arches during phonation. Coordination tests were performed without any dysmetria. Plantar reflex examination revealed bilateral plantar flexion responses.

An urgent contrast-enhanced CT scan was performed, revealing normal luminal views of the arteries in the circle of Willis, with no evidence of stenosis or aneurysmal dilatation. The patient was transferred to the neurology department. An examination by an ophthalmologist was also done in consultation. Ophthalmologist also confirmed paresis of n. abducens.

After two days, magnetic resonance (MRI) of the brain (native and post-contrast series) was performed with the following result: . In the parenchyma of the cerebrum, cerebellum, and

brainstem, no MRI signs of focal lesions or expansive changes were registered. Pathological accumulation of contrast was not detected. Ventricular system and subarachnoid spaces were presented as wide and free.

The arrangement of the bulbs and spaces behind the eyes was normal.

During the patient's hospitalization, laboratory analyses were within reference values. The patient was treated with an anticoagulant, corticosteroid, antibiotic, gastroprotective, and vitamin therapy. The patient was discharged after 12 days in an improved general condition and scheduled a follow-up examination with a neurologist in three weeks. During the patient's control examination, the pupil of the right eye was properly reactive, and abduction of the sixth cranial nerve was possible.

The patient was treated with corticosteroid and vitamin therapy for 14 days. Complete recovery of the patient was observed after one month.

Discussion

Cranial nerve (CN) palsy is a rare complication after spinal anesthesia (3). The incidence varies between 1:300 and 1:8000. All cranial nerves except cranial nerve 1, 9, and 10 can be involved. Cranial nerve 6 is the most commonly involved because of its long intracranial course. Isolated abducens palsy is more frequent in elderly patients, especially in persons with hypertension and diabetes (4). This complication is rarely observed in younger and healthy people. Differential diagnoses of this condition are tumors, leukemia, vascular lesions, sarcoidosis, infections, and hemorrhages.

Patients experiencing diplopia may also exhibit complete paralysis of the lateral rectus muscle.. This usually occurs between one day and three weeks after spinal anesthesia. In 2/3 of the patients, the symptoms subside within a week. In 25% of the patients, symptoms may persist for more than a month, while in about 10% of the patients, symptoms persist for more than 3 months (3).

Cranial nerve 6 palsy caused by low spinal fluid pressure is very rare. It is associated with a spinal fluid leak. (5) During the performance of spinal anesthesia excessive leakage of cerebrospinal fluid may occur through the injection site. If excessive leakage of cerebrospinal fluid occurs, this could result in an intracranial hypotension. During intracranial hypotension, the leakage of cerebrospinal fluid is greater than its production (6). Intracranial hypotension that occurs after spinal anesthesia could cause traction of abducens. Stretching the nerve could lead into local ischemia. It is also associated with certain symptoms, such as nausea, vomiting, and vertigo (3). When the dural puncture is performed with 26- or 27-gauge needle complications like this are rare, but could occur (7). M. rectus superior is innervated by the sixth cranial nerve. That's an explanation why cranial nerve 6 palsy causes diplopia. (8).

It's better to use a pencil-point spinal needle than a cutting spinal needle. The frequency of post-dural puncture headache (PDPH) is lower when a pencil-point spinal needle is used instead of a cutting spinal needle. (9)

The number of reported cases with this complication is very low. That's the reason why there is no much information about the mechanism of injury and treatment of this condition. Recovery is usually spontaneous. It usually lasts from 3 weeks to 8 months .

Conclusion

Although the complications from spinal anesthesia cannot be avoided it's recommended to use a smaller needle. Opting for a pencil-point spinal needle is preferred over a cutting spinal needle, as it reduces the likelihood of post-dural puncture headaches. It causes less trauma to the tissue. Intraoperative and postoperative hydration of patients is very important as well. In our case, the puncture was made with a 26-gauge needle, but the complication still occurred.

References

1. Abdulquadri O, Joe D. Spinal Anesthesia. National Library of Medicine, 2022;6;27
2. Balavenkatasubramanian, Senthilkumar, Kumar V. (2023). Current indications for spinal anesthesia: A narrative review. *Best Practice & Research Clinical Anaesthesiology*, 37(2), p.89-99
3. Quraishi SA. Abducens palsy following spinal anesthesia : Mechanism, Treatment, and Anesthetic Considerations. *MedGenMed*. 2005;7:16
4. Korkut M, Bedel C. Abducens paralysis—a rare complication of spinal anesthesia at an emergency department: a case report. *Acute Crit Care*. ;0.. doi:10.4266/acc.2021.01697
5. Mudumbai, R. Abducens (sixth nerve) paralysis. In F. H. Roy, F. W. Fraunfelder, & F. T. Fraundfelder (Eds.), *Roy and Fraunfelder's current ocular therapy*, 6th edition. Philadelphia, PA; Edinburgh: Elsevier Saunders. 2008. p. 400-401
6. Siau Tiak H, Zahari M. Isolated Abducens Nerve Palsy Following Spinal Anesthesia. *Cureus*. July 03, 2023; 15(7):e41298. doi:10.7759/cureus.41298
7. Magdić Turković, T., Sabo, G., Babić, S, et al. (2022). Spinal Anesthesia in Day Surgery – Early Experiences. *Acta clinica Croatica*, 61. (Supplement 2), p.160-164. <https://doi.org/10.20471/acc.2022.61.s2.22>
8. Cho DC, Jung ES, Chi YC. Abducens nerve palsy after lumbar spinal fusion surgery with inadvertent dural tearing. *J Korean Neurosurg Soc*. 2009;46(6): p. 581–583. doi: 10.3340/jkns.2009.46.6.581
9. Xu H., Liu Y., Song W., et al. Comparison of cutting and pencil-point spinal needle in spinal anesthesia regarding postdural puncture headache. *Medicine* . 2017;96(14) doi: 10.1097/md.0000000000006527.e6527